REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the specification

A. Specification amendments

The specification is amended, as shown in the foregoing AMENDMENT TO THE SPECIFICATION, to correct minor informalities pointed out in the Office action, including adding the exact language used in claim 92 into the specification. It is respectfully submitted that no new matter is added, as the changes simply correct minor informalities, and add the exact language recited in claim 92 into the specification.

Entry of the AMENDMENT TO THE SPECIFICATION is respectfully requested in the next Office communication.

B. Objection to the specification

Reconsideration and removal of the objection to the specification is respectfully requested.

In particular, the minor informalities noted in the Office action on page 4 are corrected, including adding the exact language used in claim 92 into the specification.

Further, with respect to the assertion on page 5 of the Office action that the "compression force" recited in claim 85 lacks proper antecedent basis, the objection is respectfully traversed. In particular, the exact wording "compression force" appears at least, for example, on page 11, line 10 of the clean version of the substitute specification filed January 21, 2003. This appearance is part of a broader discussion in lines 9-13 on page 11, which discussion provides ample antecedent basis for the compression force recited in claim 85, as well as antecedent basis for the recitation that the "compression force has been created in the side members ends by pushing off both frame side members

on the lips." As recited in the specification, the side members (by way of the lips) push off on the notch to create the compression force.

Further, as is clearly stated in the recited passage, the resilient members integrally provide reactive tensile force (shown as F2) to the compression force (shown as F1) which occurs in both side members ends.

It is clear that the illustrated pressure forces F1 that occur in the outer walls 33 and inner walls 14, are a compression force, and thus, no further amendment of the specification is deemed necessary.

Accordingly, in view of the above amendments to the specification and the preceding discussion, removal of the objection to the specification is kindly requested.

2. Objection to the drawings

The objection to the drawings is respectfully traversed on the basis of the following particulars, and removal of the objection to the drawings is kindly requested.

With regard to the assertion on page 2 of the Office action that the forces have not been sufficiently shown, it is respectfully submitted that sufficient forces have been shown such that a person having ordinary skill in the art, and an elementary understanding of physics (statics in particular) would understand from the illustrated forces what is disclosed and claimed.

Specifically, the compression forces F1, by which the attachment channels are pushed towards one another, as well as the opposing tension forces F2 generated by the corner piece to pull together the attachment channels, are clearly shown in the drawings.

Of course, a person having ordinary skill in the art will recognize that in a statically balanced structure, there are equal and opposite forces for every force within the structure.

As is recognized, the words "force," "pressure," and "stress" are very precisely defined terms in physics (statics in particular), a force being a vectorial component

describing an action at a point, a pressure being a scalar for a force per unit area (for example, per square meter), and a stress being the internal resistance of a material against externally applied forces or pressures. In general cases, stress is to be expressed as a 3 x 3 tensor.

However, in simple cases, wherein the stress in the material is just the resistance of the material to a unidirectionally applied force, the stress can be expressed as a scalar, similar to a pressure (for example, in Newton per square meter).

As is understood by persons having ordinary skill in the art, if an element is pressed at both sides thereof by a unidirectional force, these forces are called compression forces. The material inside the body of the element is thus subjected to compressive stress, whereas the exterior outside surfaces, on which the compression forces are acting, are subjected to a pressure, expressed as the force divided by the area of the surface on which these forces are acting.

Similarly, if an element is pulled at both sides by a unidirectional force, these forces are called tension forces, and result in a tensile stress inside the element.

In simple cases where the forces are acting unidirectionally, the distinction between "force," "pressure," and "stress" becomes merely academic, and in practicality, the words are quite often used interchangeably.

In a corner joint according to the present disclosure and claims, the forces are essentially unidirectional, due to the framelike structure of the corner joint.

Accordingly, the wording used in the present claims, as well as the illustrated forces F1 and F2, are sufficient to provide an understanding of the present disclosure and claims to a person having ordinary skill in the art, and thus, it is respectfully submitted that no additional forces/pressures/stresses need to be shown in the drawing figures, and removal of this drawing objection is respectfully requested.

With regard to the "press-on elements" recited in claim 95, it is respectfully submitted that the elastically bendable flaps 43, 45 identified by the Office action, and shown in Fig. 6, qualify as "press-on elements."

In particular, the wording "elastic press-on elements" is used in place of the phrase "elastic press-on means" used in the specification (page 12, lines 12-28 of the clean version of the substitute specification filed January 21, 2003) to broadly define a feature that pushes the inset parts with their sides towards the inner wall, and the elastically bendable flaps 43, 45 are an exemplary form of such "elastic press-on elements."

See in particular lines 27-28, in which a variety of "elastic press-on elements," for example, elastically bendable flaps, spiral springs, elastically compressible masses, are discussed.

Thus, since the elastically bendable flaps 43, 45 are considered to be exemplary "elastic press-on elements," it is respectfully submitted that this feature of claim 95 is shown in the drawings, at least in Fig. 6, and removal of this drawing objection is respectfully requested.

With regard to the discussion on page 3 of the Office action with respect to the inclined parts 34 being a fragment of the legs 26, it is respectfully submitted that the illustration of the whole necessarily illustrates a fragment thereof, and thus, the inclined parts 34 being a fragment of the legs 26 is inherently shown in at least Fig. 3.

Further, a thorough reading of the clean version of the substitute specification filed January 21, 2003 provides ample understanding to a person having ordinary skill in the art what is described.

Specifically, on page 8, lines 21-22, it is stated that the "corner piece does not necessarily have a full structure," but instead has "a framed structure" and is "built up of legs."

The inclined part 34, which is a fragment of the legs 26, is discussed in detail on page 9, lines 18-24. Specifically, the inclined part defines "a pressure zone between the locking means 12...and a place P on the wall..." In other words, the pressure zone formed within the legs 26 does not exist in the entire leg 26, but only in a fragment thereof, which is defined as the inclined part 34.

A person having ordinary skill in the art will recognize that the pressure zone defined by the inclined part 34 will begin at the tip of the pressed in lip 13, which is in contact with the leg 26, and will expand outwardly therefrom, within the leg 26, towards the apex where leg 26 is joined with leg 27.

Further, as discussed on page 10, line19 through page 11, line 3, most of the material of the inclined part 34 is situated on the outside of line 38, in particular, as the apex between leg 26 and leg 27 is approached.

Thus, in view of the above discussion, it is respectfully submitted that a person having ordinary skill in the art will sufficiently understand from the description what form the pressure zone defined by the inclined part 34 takes, and further, that such an inclined part 34 is sufficiently shown in the drawings for a complete understanding thereof, without the need for amendment to the drawings. Accordingly, removal of this drawing objection is respectfully requested.

3. In the claims

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

A. Claim amendments

Claims 85, 86, 91, 92, and 95 are amended to correct minor informalities noted in the Office action. It is respectfully submitted that no new matter is added as the changes merely correct minor informalities.

Claim 85 is also amended to provide antecedent basis for the recitation of "a pressure," and to clarify the each insert part has a resilient member. It is respectfully submitted that no new matter is added as the change merely corrects a minor informality.

Claims 1-84 and 93-94 remain canceled.

Claims 87-90 and 96 are left unchanged.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

B. Objection to claims 85, 86, 91, 92, and 95

As noted above, claims 85, 86, 91, 92, and 95 are amended to correct the minor informalities noted in the Office action.

Accordingly, removal of the objection to claims 85, 86, 91, 92, and 95 is kindly requested.

C. Rejection of claims 85-92, 95, and 96 under 35 U.S.C. § 112 second paragraph

Reconsideration of this rejection is respectfully requested, in view of the discussions above, below, and the amendments to claim 85, on the basis that the claims are clear and definite.

With regard to the apparent confusion regarding the use of the phrase "compression force," the detailed discussion above with regard to the forces shown in the drawings provides support for the fact that the use of the phrase "compression force" in the claims is clear and definite to a person having ordinary skill in the art, and therefore, withdrawal of this rejection is respectfully requested.

With regard to the apparent confusion regarding the use of the phrase "pushing off both frame side members on the lips," it is respectfully submitted that a person having ordinary skill in the art would understand this language. In particular, this phrase can

similarly be used to say that a person pushes off their body from a floor or a wall on their hands, for example, when performing a pushup. It is understood that the hands are a part of the body, in fact, they are a part of the body that are in contact with the supporting surface in order to push off of the body.

In a similar manner, the lips are a part of the side members, and the side members are pushed off from the corner piece by a compression force between the lips and the corner piece.

Thus, it is submitted that the phrase "pushing off both frame side members on the lips" is clear and definite, and withdrawal of this rejection is kindly requested.

Turning to the discussion of the inclined parts 34, the pressure zone defined by the inclined parts 34 is discussed above in detail, and it is respectfully submitted that the comments on pages 6-7 of the Office action are factually inaccurate. In particular, it can be seen from the drawings, and the discussion above, that the comment on page 7 of the Office action that the "lips and the place which is deeper in the attachment channels are away from the inclined part" is simply wrong. In fact, the inclined part 34 defines a pressure zone within the leg 26 that spans from the lip 13 to the place P, and thus, the inclined part 34 is actually in contact with both the lip 13 and the place P.

With respect to the tensile forces created in the resilient members by the inclined parts, an elementary understanding of physics (statics in particular) provides the necessary clarity to the claim. Only a compression stress (Sc) in the inclined part can exist, since the corner piece cannot slide in the attachment channel due to its form, specifically, the resilient members being connected to one another at an angle.

The resilient members are thus subjected to a tensile stress (created to offset the compressive stress in the inclined part) and act to pull against the inclined parts. Specifically, the tensile stress in the resilient members essentially corresponds in magnitude (with opposite sense/direction) to the tangential component (Ft) of the compression force (Fc) created by the compression of the lips on the corner piece.

This tensile stress in the resilient members results in the tension force F2 at the inner corner of the corner piece, and acts to pull the attachment channels together until they contact each other to induce the compression force F1 between the attachment channels.

Such an interaction of forces is clear and definite to a person having ordinary skill in the art, and an elementary understanding of physics (statics in particular), and thus, it is submitted that the recited inclined parts and their function is clear and definite, and withdrawal of this rejection is kindly requested.

With regard to the recitation of "the pressure" in line 37, claim 85 is amended to recite "a pressure," thus providing antecedent basis to the claim, and withdrawal of this rejection is respectfully requested.

With regard to the various recitations of "a pressure," it is respectfully submitted that it is clear from the context of the claim, and to a person having ordinary skill in the art, that each recitation of "a pressure" refers to a distinct pressure formed in a specific element recited in the claim. Accordingly, the claim is clear and definite, and withdrawal of this rejection is kindly requested.

Similarly, with regard to the various recitations of "a tension," it is respectfully submitted that it is clear from the context of the claim, and to a person having ordinary skill in the art, that each recitation of "a tension" refers to a distinct tension formed in a specific element recited in the claim. Accordingly, the claim is clear and definite, and withdrawal of this rejection is kindly requested.

With regard to the tensile forces in the resilient members resulting in pressure forces in the outer and inner walls, the manner in which these forces manifest is discussed in detail above. Thus, the claim is clear and definite, and withdrawal of this rejection is kindly requested.

With regard to the various recitations of pressure forces and compression forces, it is respectfully submitted that it is clear to a person having ordinary skill in the art that a

positive recitation of a compression force is necessarily distinct from a positive recitation of a pressure force, and thus the claim is clear and definite, and withdrawal of this rejection is kindly requested.

With regard to claim 91, it is respectfully submitted that a person having ordinary skill in the art would understand that panels can be used with a frame, and further can be wedged up in multiple places on a frame. The recitation of a panel in combination with a corner joint according to claim 85 does indeed further limit claim 85 to require the panel recited in claim 91. Further, claim 91 indentifies that such a panel is wedged up at the location of an imaginary prolongation of the respective inclined parts, which place is easily identified by inserting the corner piece into the attachment channels.

The advantage of such a configuration is that the corner piece is helping to support the panel, since the inclined parts are subjected to compressive stress which results in a compression contact force between the corner piece and the attachment channel, which is an improvement over existing windows.

Therefore, it is respectfully submitted that claim 91 is clear and definite, and withdrawal of this rejection is respectfully requested.

With regard to claim 92, it is respectfully submitted that it is clear to a person having ordinary skill in the art that each insert part recited in amended claim 85 (which are connected to each other at an angle to define the corner piece) has a single resilient member. Thus, the recitation in claim 92 of "the resilient member" is not indefinite or unclear.

Accordingly, withdrawal of this rejection is respectfully requested.

The remaining claims depend from claim 85, and are also considered to be clear and definite. Therefore, withdrawal of this rejection is kindly requested.

4. Rejection of claims 85, 86, and 95/85, 95/86 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,637,752 (*Centa*) in view of WO publication no. 91/15314 (*Heggen*) and U.S. patent no. 3,797,194 (*Ekstein*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 85, from which claims 86 and 95 depend.

The features of claim 85 have been previously summarized, and are not repeated here. Further, a discussion of how the corner joint according to the disclosure and according to claim 85 functions is provided in APPENDICES A-C. In particular, the importance of the material of the lips being compressed from a first length to a second length, which is shorter than the first length, and the forces generated in the corner joint, as recited in claim 85, are discussed in detail.

The *Centa* patent discloses a corner member 9 for use in joining two angle members 1, 21 of a manhole access cover together (col. 1, lines 4-9, 52-54; col. 2, lines 1-7). The corner members 9 do not extend the entire width of the vertical wall of the angle members 1, 21 (col. 2, lines 7-9).

The corner members 9 have on both their inner and outer surfaces a series of vertical grooves 13, the grooves side walls 14 nearer the ends of the corner members 9 sloping as a ramp to the top of the groove (Fig. 3; col. 2, lines 14-18). When the crimping tool 12 is applied it pierces tongues 15 out of the flanges 16 and bends them into the grooves 13 in the corner member 9 to engage against the sloping groove side walls 14 (col. 2, lines 18-21). Thus the further the tongues 15 are bent inwards the tighter is the jointing at the corners (col. 2, lines 21-23).

As acknowledged in the Office action on page 10, the *Centa* patent fails to disclose the shape of the notch being triangular, and a free space or clearance free of material provided on an outside corner of the corner piece, the free space or clearance

extending from the lips to at least the connecting end of the insert parts, all as required by claim 85.

Further, contrary to the assertion in the Office action on page 9, there is simply no disclosure in the *Centa* patent that the material of the crimped portions is compressed from a first length to a second length, shorter than the first length, such that the lips (tongues) generate a pre-stress in the form of pressure on both frame side members and tension in the corner piece, all as required by claim 85.

The *Centa* patent is completely silent on this feature, and simply states that the crimping tool 12 pierces tongues 15 out of flanges 16 and bends them into the grooves 13, without disclosing or suggesting that the material of the crimped portions is compressed from a first length to a second length, shorter than the first length, such that the lips (tongues) generate a pre-stress in the form of pressure on both frame side members and tension in the corner piece, all as required by claim 85.

In particular, the crimped tongues 15 are merely provided to aid with locking the angle members together, in order to prevent them from being pulled apart, however, there is no disclosure of a pre-stress provided by the tongues in order to actually pull the angle members together, as is accomplished with the recited structure of claim 85.

Further still, contrary to the assertion in the Office action on page 9, there is simply no disclosure in the *Centa* patent of inclined parts connected to free ends of the resilient members and defining a pressure zone between the lips and a place on the inner wall which is situated deeper in the attachment channels than the lips to provide a pressure between the place and the lips, or the inclined parts creating a tensile force in the resilient members, by way of the pressure in the inclined parts resulting in tension in the resilient members, as is required by claim 85.

Even if the tip of the corner member is considered to be an inclined part, it does not extend from the tongue (lip) to a place on the inner wall to define a pressure zone therein, as is required by claim 85. This is due to the fact that there is a lateral connection

portion (Figs. 3, 4, 6) between the tongue 15 and the tip of the corner member, such that there is no inclined part from the tongue (lip) to a place on the inner wall.

Even further still, contrary to the assertion in the Office action on page 9, there is no disclosure in the *Centa* patent that the resilient members are positioned generally along and in contact with the inner wall of the respective attachment channel, as is required by claim 85. In particular, there are grooves 13 in the sidewalls of the corner member 9 that provide gaps between the corner member and the grooves 4, 5, of the angle members 1.

The Office action turns to the *Heggen* publication to cure the deficiency of the triangular shaped notch, recited in claim 85, but missing from the *Centa* patent.

However, even if the triangular shaped notch of the *Heggen* publication were to be added to the joint of the *Centa* patent in place of the grooves 13, the proposed combination would still fail to disclose all of the other features of claim 85 that are missing from the *Centa* patent, as discussed immediately above.

In particular, the *Heggen* publication makes no disclosure or suggestion of that the material of the crimped portions is compressed from a first length to a second length, shorter than the first length, such that the lips generate a pre-stress in the form of pressure on both frame side members and tension in the corner piece, all as required by claim 85.

In fact, similarly to the *Centa* patent, the crimped portions of the *Heggen* publication are merely provided to aid with locking the angle members together, in order to prevent them from being pulled apart, however, there is no disclosure of a pre-stress provided by the tongues in order to actually pull the angle members together, as is accomplished with the recited structure of claim 85.

Further, the *Heggen* publication fails to disclose the inclined parts recited in claim 85, and missing from the *Centa* patent.

Further still, the *Heggen* publication fails to disclose a free space or clearance free of material provided on an outside corner of the corner piece, the free space or clearance extending from the lips to at least the connecting end of the insert parts, all as required by claim 85, and missing from the *Centa* patent.

The Office action next turns to the *Ekstein* patent as disclosing a free space or clearance free of material provided on an outside corner of the corner piece, the free space or clearance extending from the lips to at least the connecting end of the insert parts, all as required by claim 85.

To begin, a person having ordinary skill in the art would not have decided to remove material from the corner member 9 of the *Centa* patent, in the manner as generally shown in the *Ekstein* patent, since doing so would clearly decrease the structural integrity of the corner member 9 of the *Centa* patent.

Further, even if the material of the corner member 9 of the *Centa* patent is removed in a manner as generally shown in the *Ekstein* patent, the proposed combination still fails to disclose the material of the lips is compressed from a first length to a second length, shorter than the first length, such that the lips generate a pre-stress in the form of pressure on both frame side members and tension in the corner piece, all as required by claim 85, and missing from the *Centa* patent and the *Heggen* publication.

Further still, even if the material of the corner member 9 of the *Centa* patent is removed in a manner as generally shown in the *Ekstein* patent, the proposed combination still fails to disclose the inclined parts recited in claim 85, and missing from the *Centa* patent and the *Heggen* publication.

In view of the above discussion, it can be seen that the proposed combination of the *Centa* patent, the *Heggen* publication, and the *Ekstein* patent fails to disclose every feature recited in claim 85, and therefore, a *prima facie* case of obviousness cannot be established with respect to claim 85, from which the remaining claims depend. Therefore, withdrawal of this rejection is respectfully requested.

5. Rejection of claims 87, and 95/87 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,637,752 (*Centa*) in view of WO publication no. 91/15314 (*Heggen*) and U.S. patent no. 3,797,194 (*Ekstein*) and further in view of German publication no. DT 2522523 (*Rottner*)

Reconsideration of this rejection is respectfully requested, on the basis that the *Rottner* publication fails to provide for the deficiencies of the *Centa* patent, the *Heggen* publication, and the *Ekstein* patent, as discussed above in detail with respect to claim 85, from which claims 87 and 95 depend.

In fact, the *Rottner* publication discloses a contrary teaching to the feature of claim 85, that the material of the lips is compressed from a first length to a second length, shorter than the first length, such that the lips generate a pre-stress in the form of pressure on both frame side members and tension in the corner piece, and instead discloses a thinning and stretching of the material that is pressed in (translation page 3, lines 30-31).

Accordingly, the proposed combination of the *Centa* patent, the *Heggen* publication, the *Ekstein* patent, and the *Rottner* publication fails to establish a *prima facie* case of obviousness with respect to claim 85, from which claims 87 and 95 depend, and withdrawal of this rejection is respectfully requested.

6. Rejection of claims 89, 90, 92, 95/89, 95/90, and 95/92 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,637,752 (*Centa*) in view of WO publication no. 91/15314 (*Heggen*) and U.S. patent no. 3,797,194 (*Ekstein*) and further in view of French publication no. FR 2734599 (*Flechner*)

Reconsideration of this rejection is respectfully requested, on the basis that the *Flechner* publication fails to provide for the deficiencies of the *Centa* patent, the *Heggen* publication, and the *Ekstein* patent, as discussed above in detail with respect to claim 85, from which claims 89, 90, 92, and 95 depend.

Accordingly, withdrawal of this rejection is respectfully requested.

7. Rejection of claims 91 and 95/91 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,637,752 (*Centa*) in view of WO publication no. 91/15314 (*Heggen*) and U.S. patent no. 3,797,194 (*Ekstein*) and further in view of European publication no. EP 0412669 (*Rhodes*)

Reconsideration of this rejection is respectfully requested, on the basis that the *Rhodes* publication fails to provide for the deficiencies of the *Centa* patent, the *Heggen* publication, and the *Ekstein* patent, as discussed above in detail with respect to claim 85, from which claims 91 and 95 depend.

Accordingly, withdrawal of this rejection is respectfully requested.

8. Allowable subject matter

The applicant gratefully acknowledge the indication of allowable subject matter in claims 88, 95/88, and 96. However, in view of the above discussion, it is respectfully submitted that claim 85 is patentable, and thus, claims 88, 95/88, and 96, which depend from claim 85, have not been rewritten in independent form.

9. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Respectfully submitted,

/Patrick M. Buechner/

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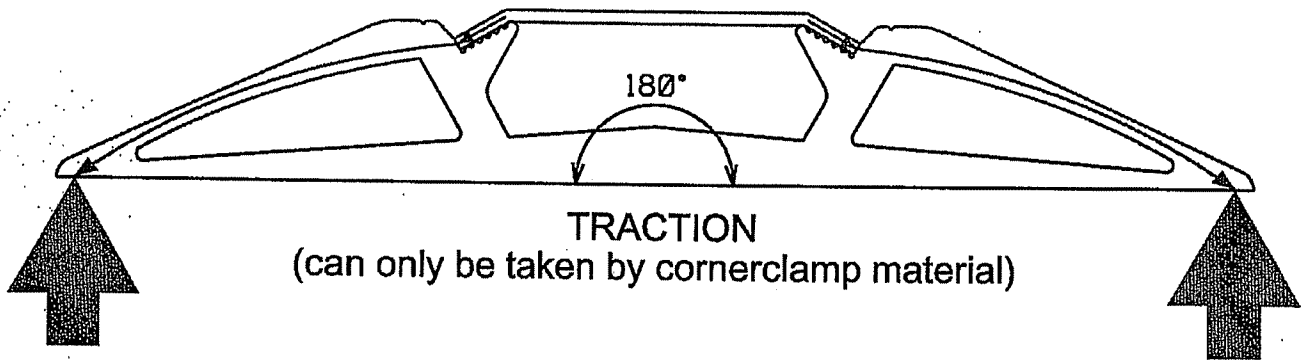
PRINCIPLE of a bridge... (or armed concrete)

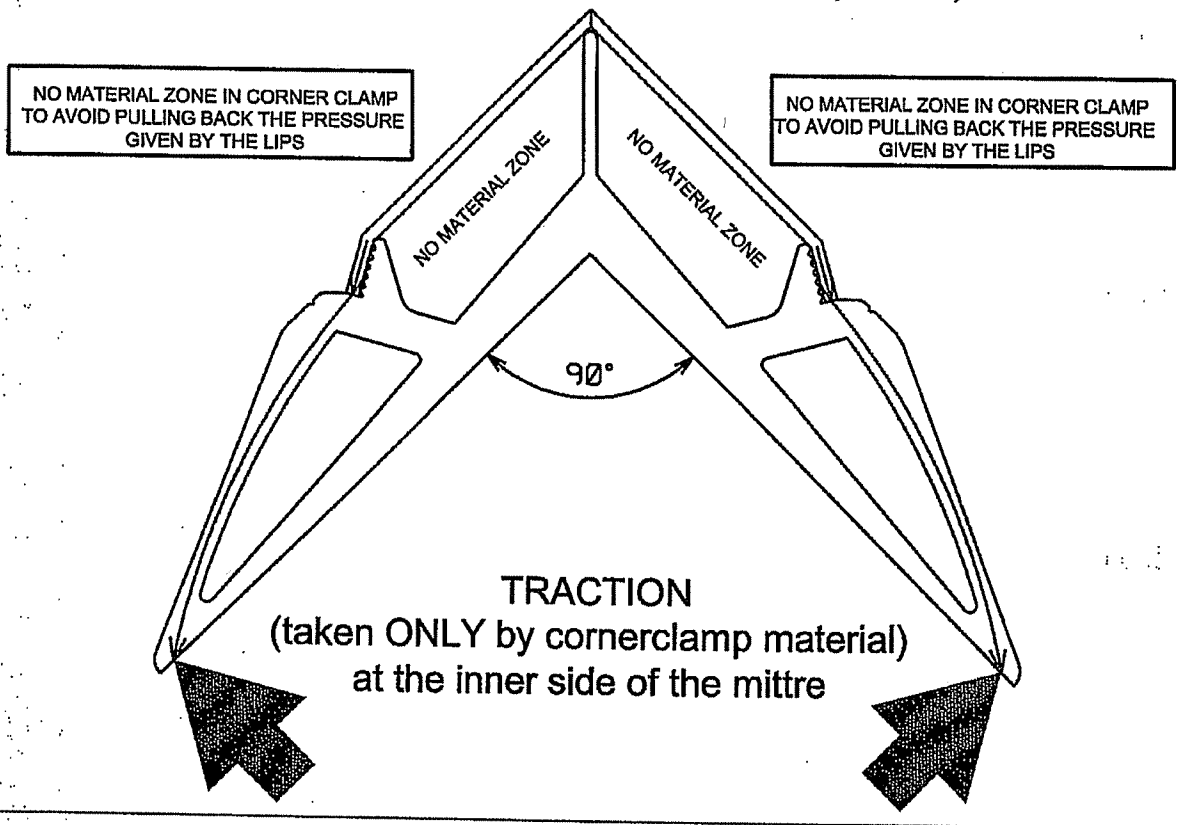
PRESSURE
(given thanks to compression of material
of the in pressed flaps of the tubular profiles)



TRACTION
(can only be taken by cornerclamp material)

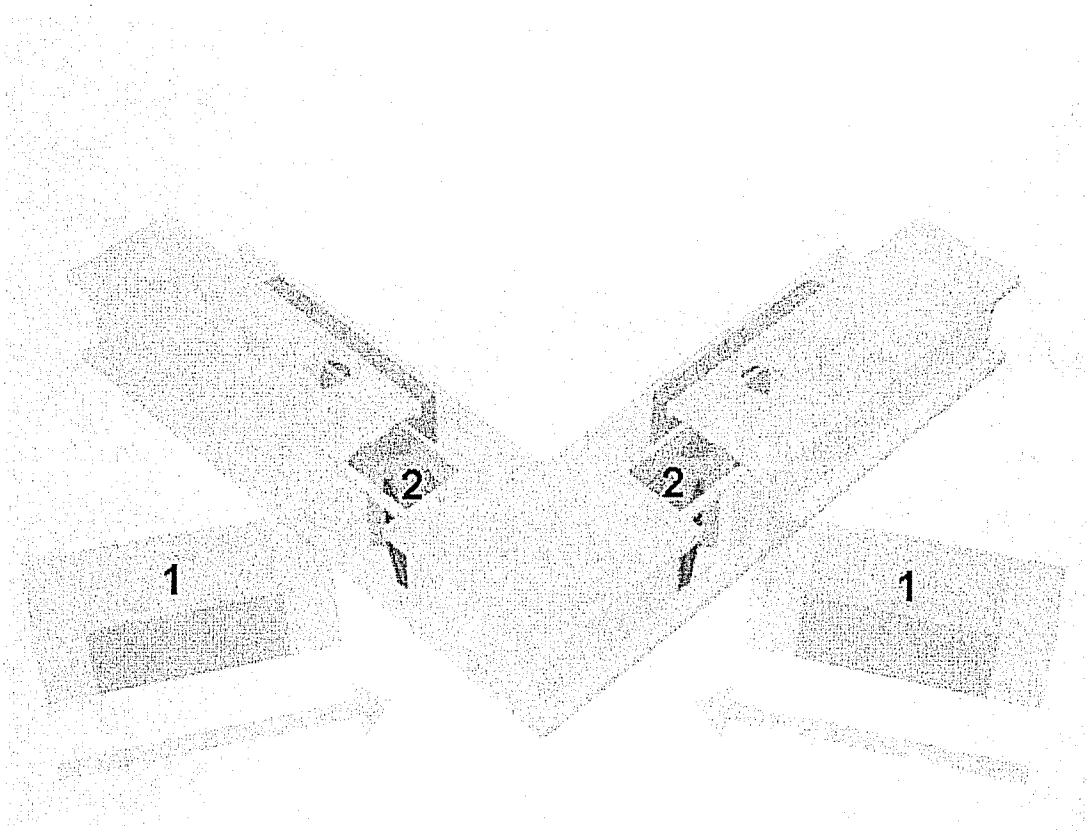
... for the first time applied under 90° in aluminum window-frames

PRESSURE
(given, thanks to compression of material
of the in pressed flaps of the tubular profiles)



TRACTION
(taken ONLY by cornerclamp material)
at the inner side of the mittre

1. Conventional Corner Joint



A. Two attachment channels (grey) are slid over the insert parts of the corner piece.

B. The assembly is put into a press.

C. Steel knifes (1) of the press cut under a certain angle into the walls of the attachment channels in order to form lips (2), which are pressed into a notch in the corner piece.

D. A "joint" is obtained between the attachment channels and the corner piece.

According to a conventional corner joint however, the relatively weak and hollow attachment channels were attached and blocked onto a much stronger corner piece.

2. *Impulse for coming to the invention: the discovery of a joining force generated by pressed in lips*

THE INVENTOR OF THE PRESENT APPLICATION CAME TO ANOTHER CONCEPT AS FOLLOWS ...

The discovery that there is a joining force due to lips being compressed by reducing their length was the first step to come to the invention.

(See Figure 4 of the patent application hereafter)

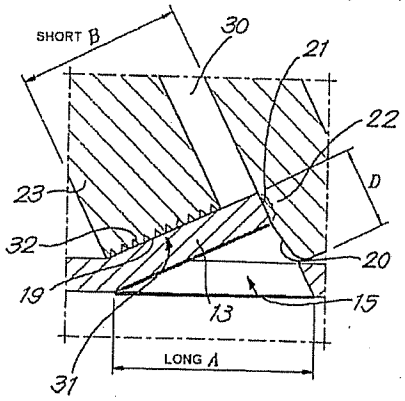
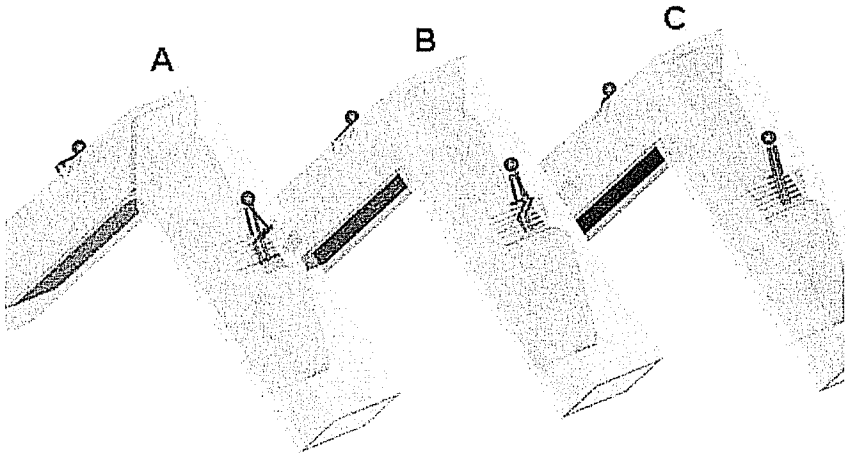


Fig. 4

Or see the following more illustrative drawings (from left to right):

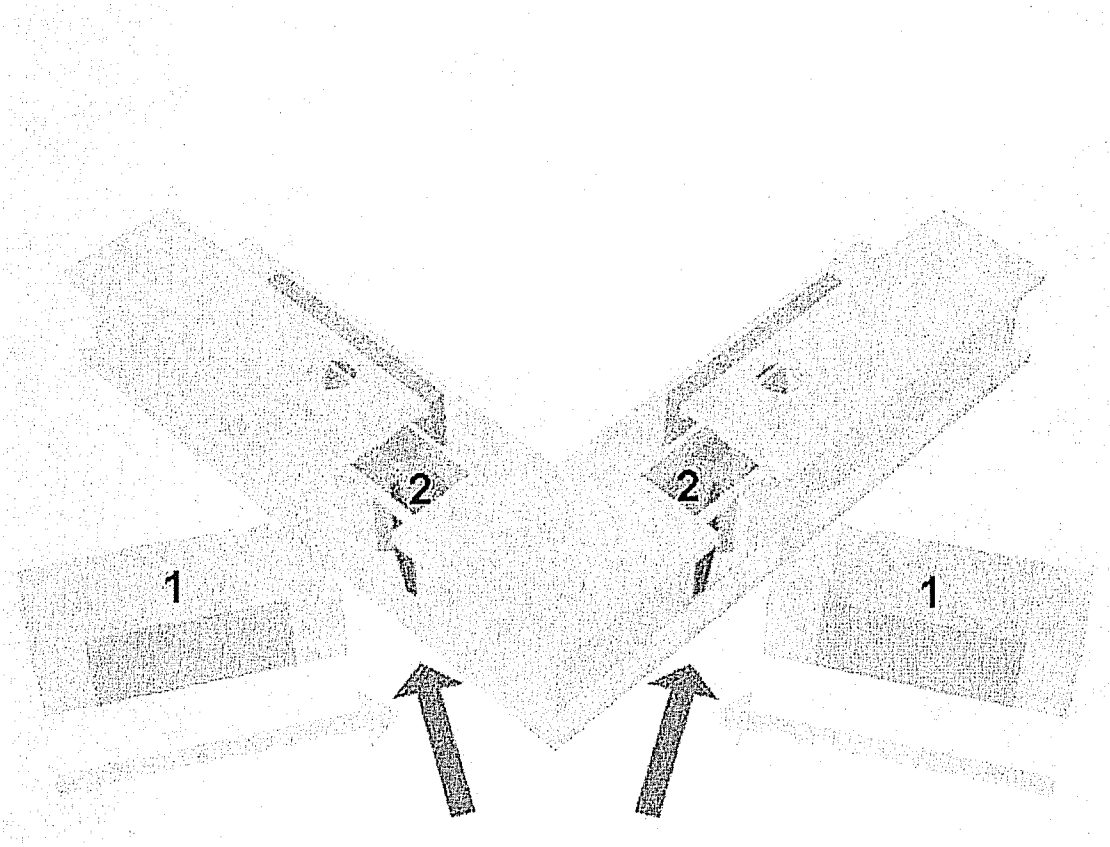


A. Before the lips are pressed in, they are more or less like little men which stand in a bent over position.

B. The knifes of the press push against the rears of said men, so the feet of those men will exert a larger force on the corresponding side of the notch.

C. After the lips have been pressed completely into the notch, the little men are in the upright position with their knees against the other side of the triangular notch, so that the knees of the men (which correspond to the lips) cannot collapse any more and therefore with the knees a permanent pressure can be exerted without fatigue or collapsing.

3. Thus, a new method for joining mitred attachment channels was obtained



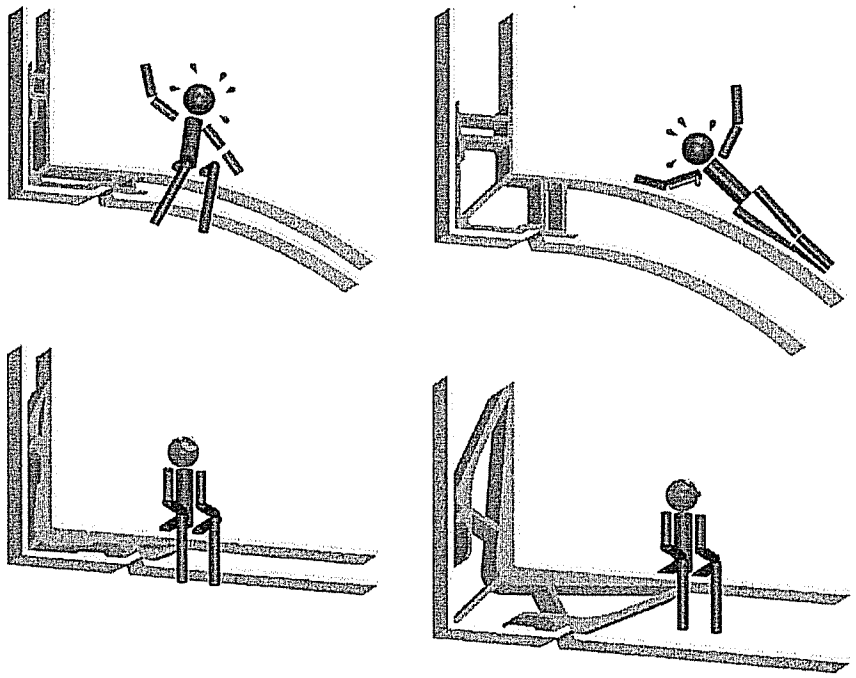
By pressing the lips in a notch, their length is reduced, which results in a pressure force (indicated by the generally vertical arrows) equal to 16 kg/mm² on the corresponding sides of the notch.

4. A corner joint according to the application compared with the conventional corner joints

Reference is made to the four drawing figures below.

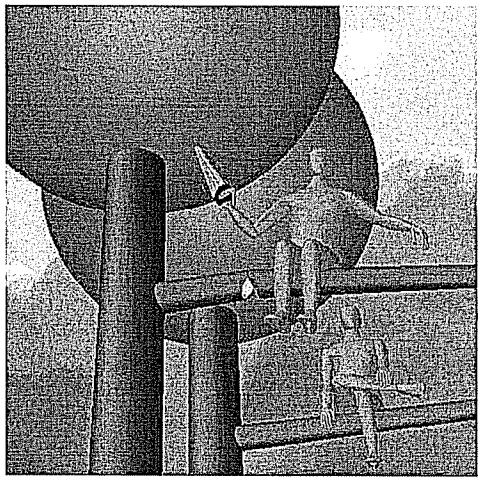
The two drawings on top relate to "conventional corner joints."

The two drawing at the bottom are directed to "corner joints according to the present application."

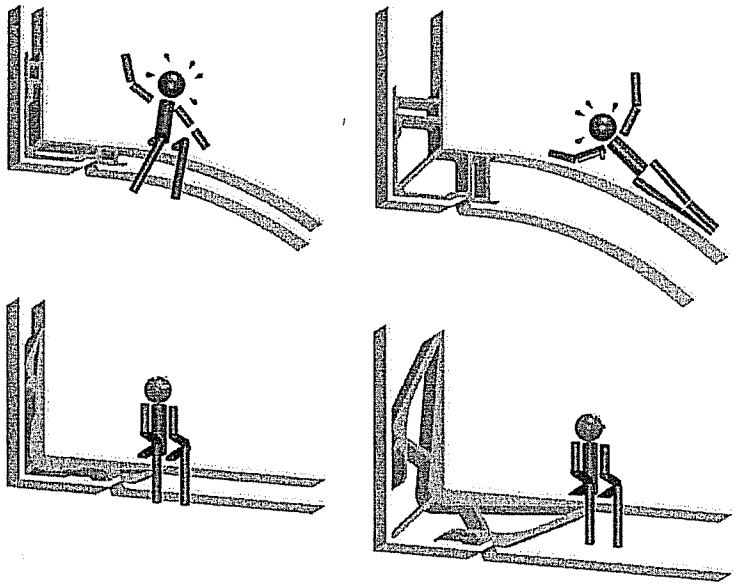


Corner pieces known according to the state of the art have insert parts which are much too short. As a consequence, a window-glass that must be installed in such a frame realized with the known corner pieces is supported on a weakened zone of the attachment channels. Indeed, the lips leave a hole in the structure of the attachment channel.

The situation can be compared with a branch of a tree which is partly cut at its underside a meter or so from the tree trunk, after which a person sits on the branch past the undercut side of the branch.



APPENDIX B



A corner joint according to the application (see the two drawings at the bottom of the Figure) is advantageous in that the insert parts are much longer. Actually their length is function of the width of the attachment channels. A wall of an attachment channel is always present in the prolongation of the pressure generated by the pressed-in lips.

As a consequence, a glass-window to be installed in a frame made by corner joints according to the present application is supported in a zone of the attachment channels at the top of the inclined parts which are put under pressure by the lips. Such a support is an improvement over conventional corner joints.

In the past it was always believed that the pressed-in lips are used just to connect the rather weak attachment channels to a corner piece of substantial structural strength. Therefore, in the known systems, the width of the lips is maximum 5 to 6 mm.

Lips with a larger width were impossible to use since it would create a large hole in the attachment channels, which would weaken the attachment channels too much for supporting a glass panel on the attachment channel.

On the contrary, in the present application the lips are made as wide as possible in order to generate sufficient stress in the corner piece.

When aluminium is compressed it will deform elastically as long as the compression force is not larger than 16 kg/mm^2.

So, if a lip is created in a profile of 2mm thickness, the lip having a width of 12 mm, its tip surface will be 24 mm^2.

If a lip with such dimensions is compressed, the pressure generated on the mitred joint is 384 kg. That is the reason why the corner joint according to the application is so strong, even

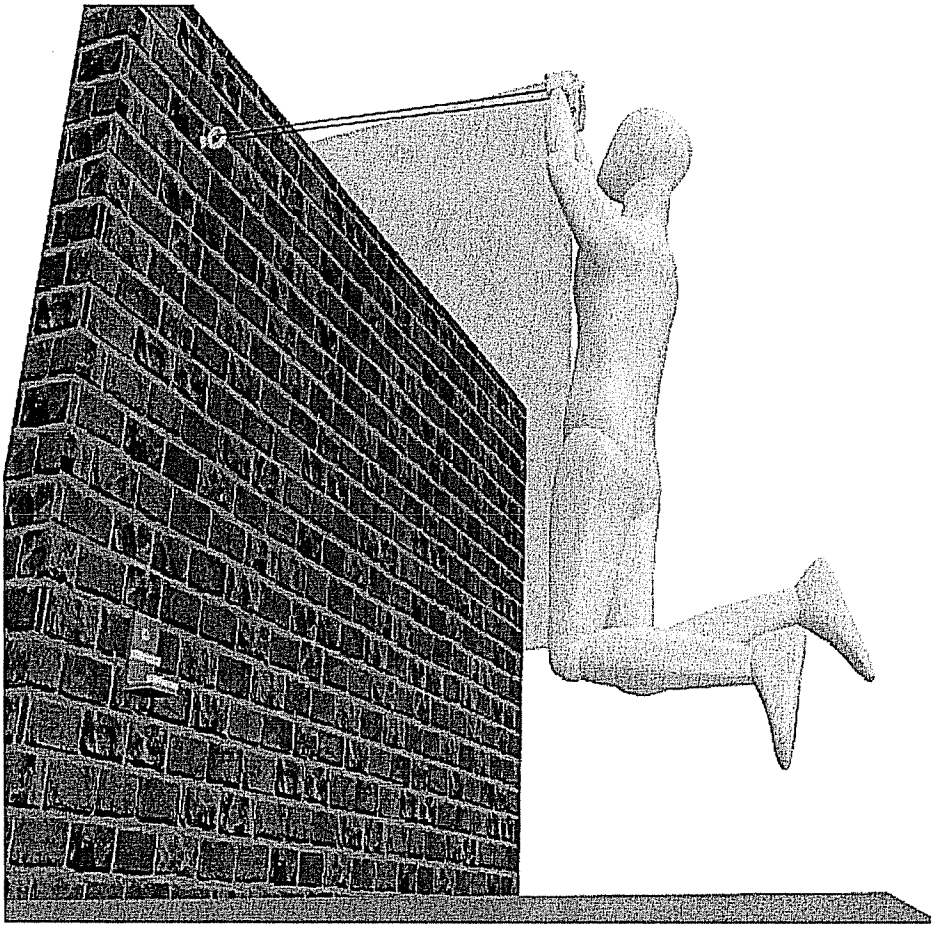
though there is substantially less material used, in particular at the connection between the insert parts of the corner joint.

As a consequence the attachment channels, as well as the corner piece, don't need to have any stiffness for supporting a window-glass, which was proved by test in Belgium (see APPENDIX C).

Another aspect of the invention is regarding the use of the corner joint in rotating window or door frames.

Such a rotating window frame must resist the load of a window during a short period when it is opened. (As for example when a door is opened, windows are cleaned, a room is ventilated, etc.)

The most elementary construction for such a frame consists of a single rigid support at the bottom and for example a pulling rope at the top, which has no stiffness at all.



Frames built with corner joints according to the present application can be compared to such configurations in that the forces are generated at the most effective locations of the frame for supporting a glass panel.

WTCB
CSTC

WETENSCHAPPELIJK EN TECHNISCH CENTRUM VOOR HET BOUWBEDRIJF

INRICHTING ERKEND BIJ TOEPASSING VAN DE BESLUITWET VAN 30 JANUARI 1947

- Proefstation : B-1342 Limelette, avenue P. Holoffe, 21 — Tel : (32) 2 655 77 11 — Fax : (32) 2 653 07 29
- Kantoren : B-1932 Sint-Stevens-Woluwe, Lozenberg, 7 — Tel : (32) 2 716 42 11 — Fax : (32) 2 725 32 12
- Maatschappelijke zetel : B-1000 Brussel, Lombardstraat, 42 — Tel : (32) 2 502 66 90 — Fax : (32) 2 502 81 80

BTW nr. : BE 407.695.057

LABORATORIUM :	PROEFVERSLAG	Nr. DE, ATA, RE:	651 XF 180
SCAR		Nr. Labo :	CAR 6006/8
		Nr. Monster :	2006 / 24 / 008

AANVRAGER : CARTOFLEX RAMEN
Nijverheidskaai, 3a
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Gecontacteerde personen :	- Aanvrager -	- WTCB -
	De Heer A. Brochez	De Heer B. Michaux

Uitgevoerde proeven : Wind-, water-, luchtdichtheidsproeven, verkeerd gebruik en bedieningskrachten op een raam (DK)

Referenties : STS 52 «Vensters en deuren: productnorm» versie 2005 en andere Europese normen voor classificatie en proeven

Datum en referentie van de aanvraag	: 2006.05.22
Ontvangstdatum van de proefstuk(ken)	: 2006.06.13
Datum van de proef	: 2006.07.11
Datum opstelling van het verslag	: 2006.07.24

Dit proefverslag bevat **15** pagina's, genummerd van **1/15** tot en met **15/15**, en mag slechts in zijn geheel verveelvoudigd worden.
Elk blad van het origineel verslag is afgestempeld met de laboratoriumstempel (in het rood) en geparafeerd door het laboratoriumhoofd.
De resultaten en waarnemingen zijn slechts geldig voor de beproefde proefstukken.

- ☐ Geen proefstuk
- ☐ Proefstuk(ken) onderworpen aan destructieve proef
- ☑ Proefstuk(ken) 60 kalenderdagen na het opsturen van het verslag uit onze laboratoria verwijderd, behalve bij andersluidende schriftelijke aanvraag

Opvolging van de proeven — Laboratoriumhoofd

Ir. B. Michaux — Ir. B. Parmentier

Verantwoordelijke van de proeven : Chr. De Rijcke

BMI/

1. INLEIDING

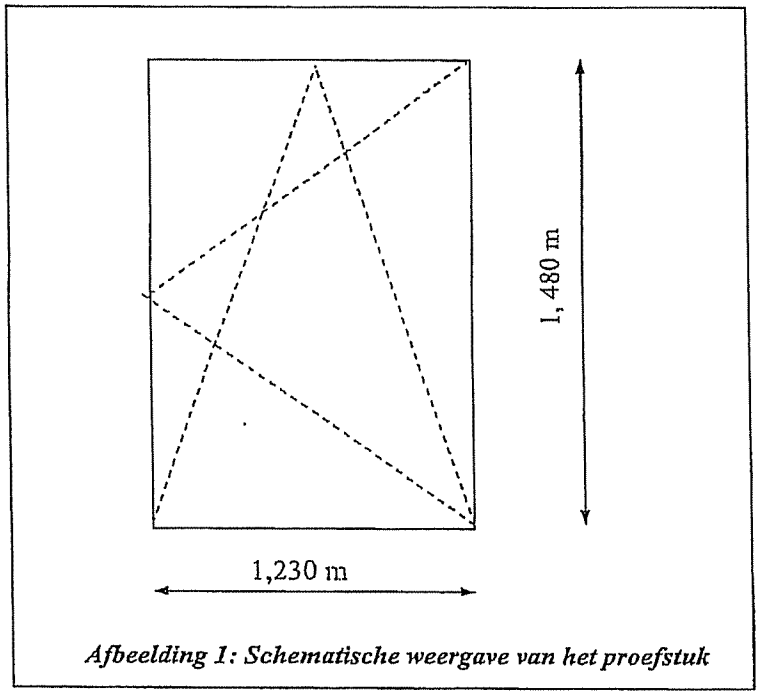
Op verzoek van de firma Cartoflex, vertegenwoordigd door de heer Brochez, heeft het WTCB proeven uitgevoerd ter bepaling van de luchtdoorlaatbaarheid, de windweerstand en de waterdichtheid van een venster. Deze proeven worden aangeduid met de referentie CAR 6006/8.

2. BESCHRIJVING VAN HET PROEFSTUK

Het proefstuk werd op 13 juni 2006 afgeleverd op het proefstation van het WTCB te Limelette en werd door het laboratorium SCAR onder de rubriek 2006/24/008 ingeschreven in het ontvangstregister van de proefstukken. Het gaat om een aluminium venster waarvan de technische beschrijvingen hieronder worden gegeven.

2.1. Schematische afbeelding van het beproefde venster

De schematische afbeelding van het beproefde element wordt op afbeelding 1 weergegeven.



Afbeelding 1: Schematische weergave van het proefstuk

2.2. Afmetingen van het venster

Totaal venster (buitenafmetingen): - hoogte : 1,480 m
- breedte : 1,230 m
- oppervlakte: 1,820 m²

Vleugel : - lengte van de dichtingsstrips: 5,244 m

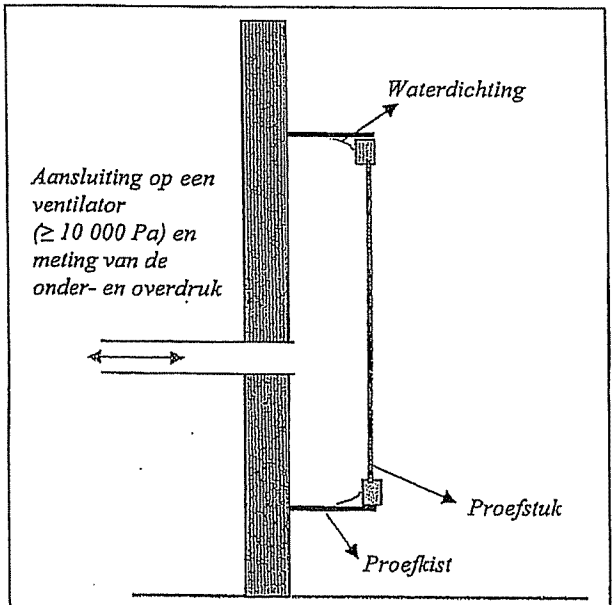
2.3. Beschrijving van de samenstellende elementen van het venster

De kenmerken van de samenstellende elementen van het proefstuk werden gegeven door de aanvrager en worden hieronder hernomen (* aanvullende eventuele waarnemingen door het laboratorium):

- **Venstertype :** draai-kip
- **Venstersysteem :** **ULTIMA 60** –reeks van Cartoflex bvba
- **Venstermateriaal :** aluminium met thermische onderbreking
- **Thermische onderbreking :** polyamide strippen geklemd
- **Oppervlaktebehandeling :** gelakt RAL niet aangegeven
- **Verbindingsmethode van de hoeken :** pershoeken
- **Lijm pershoeken :** monocomponent polyurethaan MAWEX in de inkepingen van de pershoeken
- **Lijm versteksnedes :** merknaam TEKNA.
- **Dichtingstrip tussen vleugel en vaste kader :**
  - buiten dichting ref: RMULTIF in een groef van het vast kader
  - midden dichting ref: RMID - in een groef van het vast kader - de hoeken zijn gelijmd
  - aanslag dichting ref: RMULTIF - in een groef van de vleugel
  - merk: ULTIMA 60
- **Beglazing :** 6/15/6
- **Beglazingswijze :** voorgevormde EPDM dichtingsstrip aan beide zijden van de beglazing
- **Voorgevormde dichtingsstrip :** buiten ref.: RMULTIF – binnen ref.: RGL 4
- **Afmetingen van de glassponning van de vleugel :** hoogte 22 mm
- **Ontwatering onder de beglazing :** 2 sleuven van 6 × 12 mm
- **Ventilatie van de glassponning :** (zie pag.15) 2 gaten diam. 6 mm in de stijlen van de vleugels en 2 gaten diam. 6mm in de horizontale bovenregel van de vleugel.
- **De glaslatten zijn geklipst**
- **Hang- en sluitwerk :** - hangpunten : 2 × SOBINCO CHRONO
  - sluitpunten : 5 × SOBINCO CHRONO
  - bedieningskruk : SOBINCO
- **Ontwatering van het vaste kader :** (zie pag.15)
  - Horizontaal in de profielsectie van de buitenkoker: 2 sleuven van 6 × 20 mm
  - Vertikaal op buitenzichtzijde: 2 sleuven van 6 x 12 mm op de raambuitenzijde met afvoerkapjes

(*) De doorsneden en detailtekeningen van het gevelelement worden op blz. 12, 13 en 14 weergegeven.

3. BESCHRIJVING VAN DE PROEVEN

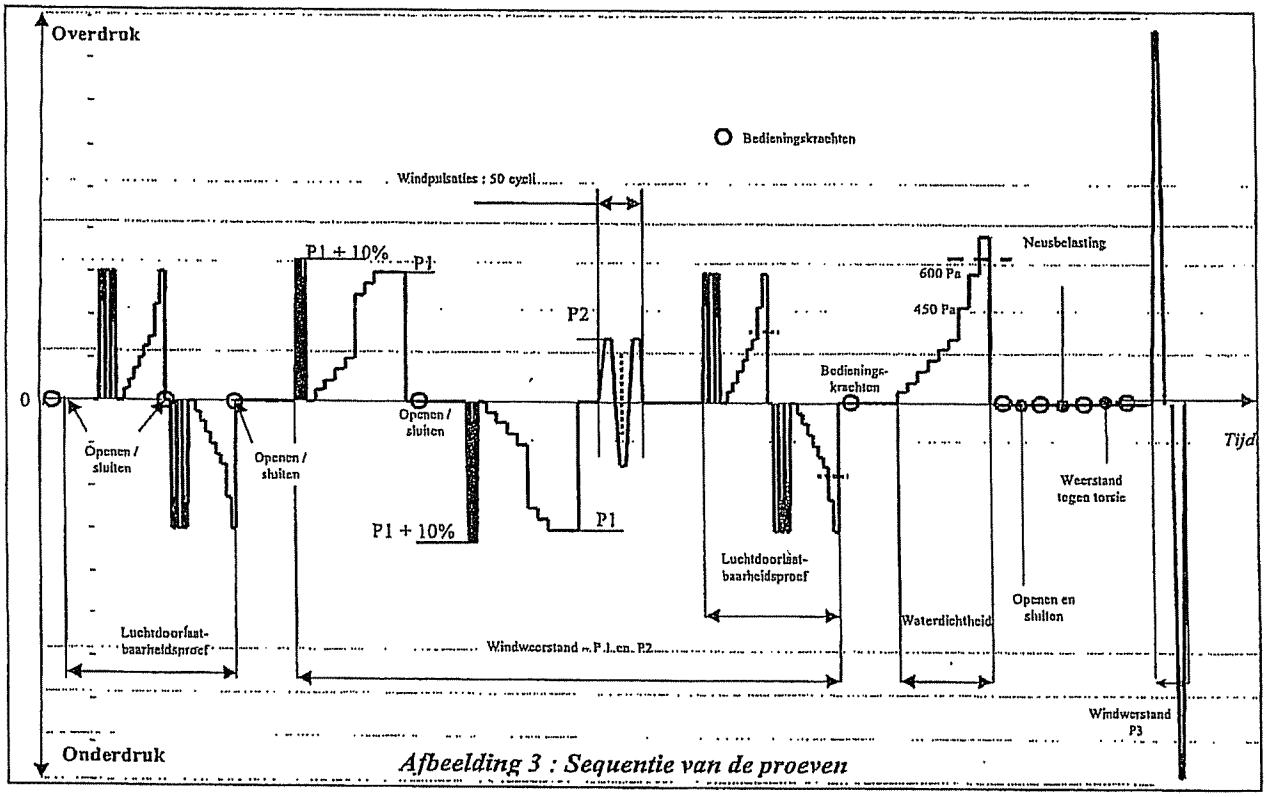


Afbeelding 2: Verticale doorsnede van de windkist

De luchtdoorlaatbaarheid, de windweerstand, de waterdichtheid en de andere weerstanden van een gevelelement worden bepaald op basis van een proef in een windkist volgens de STS 52.0 versie 2005.

De onder- en overdrukken worden onder de windkist uitgeoefend met behulp van een ventilator en een systeem van elektrisch bediende kleppen om deze drukken tot stand te brengen (zie afbeelding 2).

Alle proeven werden uitgevoerd volgens de opeenvolging van de norm prEN 14351 beschreven in afbeelding 3 en tabel 1.



Afbeelding 3 : Sequentie van de proeven

Tabel 1: Sequentie en normen van de proeven

		Classificatie	Beschrijving van de proef
1	Bedieningskrachten	NBN EN 13115	NBN EN 12046-1
2	Luchtdoorlatendheid	NBN EN 12207	NBN EN 1026
3	Windweerstand (P1 en P2)	NBN EN 12210	NBN EN 12211
4	Luchtdoorlatendheid (verificatie)	NBN EN 12207	NBN EN 1026
5	Waterdichtheid	NBN EN 12208	NBN EN 1027
6	Bedieningskrachten	NBN EN 13115	NBN EN 12046-1
7	Openen en sluiten	NBN EN 12400	NBN EN 1191
8	Bedieningskrachten	NBN EN 13115	NBN EN 12046-1
9	Verkeerd gebruik (neusbelasting)	NBN EN 13115	NBN EN 14608
10	Bedieningskrachten	NBN EN 13115	NBN EN 12046-1
11	Verkeerd gebruik (torsie)	NBN EN 13115	NBN EN 14609
12	Bedieningskrachten	NBN EN 13115	NBN EN 12046-1
13	Windweerstand (P3: veiligheid)	NBN EN 12210	NBN EN 12211

3.1 Luchtdoorlaatbaarheidsproef in over- en onderdruk

De luchtdoorlaatbaarheidsproeven worden uitgevoerd volgens de normen NBN EN 12207 en NBN EN 1026.

A. Beschrijving van de proef

De luchtdoorlaatbaarheidsproeven in druk en onderdruk worden uitgevoerd volgens de opeenvolging aangegeven in afbeelding 3. Na de uitvoering van 3 pulsaties (10% boven de maximale proefdruk) wordt trapsgewijs de druk opgevoerd tot 300 Pa per trap van 50 Pa en vervolgens boven de 300 Pa per trap van maximum 150 Pa.

B. Classificatie

B.1. Classificatie gebaseerd op de luchtdoorlatendheid van de totale oppervlakte

De luchtdoorlatendheid door het lichaam van het proefstuk, gemeten volgens de NBN EN 1026, wordt gedeeld door zijn totale oppervlakte en het resultaat wordt uitgedrukt in $m^3/h.m^2$. De classificatie wordt gegeven in tabel 2.

Tabel 2: Classificatie gebaseerd op de totale oppervlakte van het venster

Klasse	Referentie luchtdoorlatendheid bij 100 Pa ($m^3/h\ m^2$)	Maximale proefdruk (Pa)
0	Geen proef uitgevoerd	
1	50	150
2	27	300
3	9	600
4	3	600

B.2. Classificatie gebaseerd op de luchtdoorlatendheid van de opengaande delen

De luchtdoorlatendheid van het beproefde element, gemeten volgens de NBN EN 1026, wordt gedeeld door de lengte van de opengaande voegen en het resultaat wordt uitgedrukt in $m^3/h.m$.

De classificatie gebaseerd op de voeglengte wordt gegeven in tabel 3.

Tabel 3: Classificatie gebaseerd op de voeglengte

Klasse	Referentie luchtdoorlatendheid bij 100 Pa ($m^3/h\ m$)	Maximum proefdruk (Pa)
0	Geen proef uitgevoerd	
1	12,50	150
2	6,75	300
3	2,25	600
4	0,75	600

De resultaten omvatten twee grafieken van de doorlatendheid per oppervlakte- of lengte-eenheid van de voegen in overdruk voor het eerste diagram en in onderdruk voor het tweede.

3.2 Windweerstandsproef

De windweerstandsproeven worden uitgevoerd volgens de normen NBN EN 12210 en NBN EN 12211.

A. Beschrijving van de proef

De volgende proeven worden uitgevoerd:

1. Plaatsing van de vleugel in overdruk P_1 + 10% (drie)
2. Meting van de vervormingen van 0 → P_1 in overdruk
3. Plaatsing van de vleugel in onderdruk -(P_1 + 10%) (drie)
4. Meting van de vervormingen van 0 → - P_1 in onderdruk
5. Vermoeiingsproeven door herhaalde windpulsaties:
   - 50 cycli 0 → + P_2 in overdruk → 0 → - P_2 in onderdruk → 0
6. Veiligheidsproef tot P_3 in over- en - P_3 in onderdruk.

B. Classificatie

De classificatie voor de windweerstand wordt in tabellen 4 en 5 gegeven.

Tabel 4: Criteria voor prestatieniveaus

Prestatieniveau	Vervormingsproef P1 (Pa)	Herhaalde drukken en onderdrukken P2 (pulsaties) (Pa)	Veiligheidsproef P3 (Pa)
0	Geen proef		
1	400	200	600
2	800	400	1200
3	1200	600	1800
4	1600	800	2400
5	2000	1000	3000
E_{XXXX}	XXXX		

Tabel 5: Criteria voor vervorming

Klasse	Doorbuiging f
A	< L/150
B	< L/200
C	< L/300

3.3 Waterdichtheidsproef

De waterdichtheidsproeven worden uitgevoerd volgens de normen NBN EN 12208 en NBN EN 1027.

A. Beschrijving van de proef

De opeenvolging van de waterdichtheidsproef wordt in afbeelding 3 gegeven. De besproeiingsmethode is de methode A: De sproeihoek bedraagt 120° en de sproeias helt met een hoek van 24° t.o.v. de horizontale.
De eerste besproeiing duurt 15 minuten vooraleer trapsgewijs per 5 minuten de druk opgevoerd wordt tot 300 Pa per trap van 50 Pa en boven de 300 Pa per trap groei van 150 Pa.

B. Classificatie

De waterdichtheid van het beproefde element, gemeten volgens de NBN EN 1027, wordt beoordeeld door visuele waarneming van het geteste element.
De classificatie wordt in tabel 6 gegeven.

Tabel 6: Classificatie van de waterdichtheid

Klasse	Overdruk (Pa)	Specificatie
0	-	Geen
1A	0	Besproeiing tijdens 15 min
2A	50	Idem Klasse 1 + 5 min
3A	100	Idem Klasse 2 + 5 min
4A	150	Idem Klasse 3 + 5 min
5 A	200	Idem Klasse 4 + 5 min
6 A	250	Idem Klasse 5 + 5 min
7 A	300	Idem Klasse 6 + 5 min
8 A	450	Idem Klasse 7 + 5 min
9 A	600	Idem Klasse 8 + 5 min
E_{xxxx} A	> 600	Na 600 Pa per trap van 150 Pa (5 min)

3.4 Bedieningskrachten

De proeven voor de bedieningskrachten worden uitgevoerd volgens de normen NBN EN 13115 en NBN EN 12046-1.

A. Beschrijving van de proef

De proef bestaat uit de meting van de kracht of het minimum statisch moment nodig voor het ontgrendelen of vergrendelen van het hang- en sluitwerk (sloten en handgrepen), het beginnen van de opening en het sluiten van de vleugel.
De proef begint met de gesloten vleugels van het proefstuk en met alle hang- en sluitwerk in volledig vergrendelde toestand.
De proeven worden uitgevoerd volgens de onderstaande voorafbepaalde volgorde om de bedieningskrachten en -koppels toe te passen en te meten:
1° losmaken van de vergrendeling;
2° begin van de opening (tot 100 mm);
3° begin van de sluiting tot begin van het vastmaken van de vergrendeling;
4° volledig vastmaken van de vergrendeling;
5° de trappen 1 tot 4 driemaal herhalen en het gemiddelde resultaat bepalen.

B. Classificatie

Tabel 7 geeft de krachten en/of momenten weer waaraan de opendraaiende, openvallende en openschuivende vensters volgens de verschillende klassen worden onderworpen.

Tabel 7: Classificatie voor de bedieningskrachten

Klasse	Opendraaiend of openschuivend venster	Handgrepen (bediening met de hand)	Handgrepen (bediening met de vinger)
0	-	-	-
1	100 N	100 N of 10 Nm	50 N of 5 Nm
2	30 N	30 N of 5 Nm	20 N of 2 Nm

4. RESULTATEN VAN DE PROEF

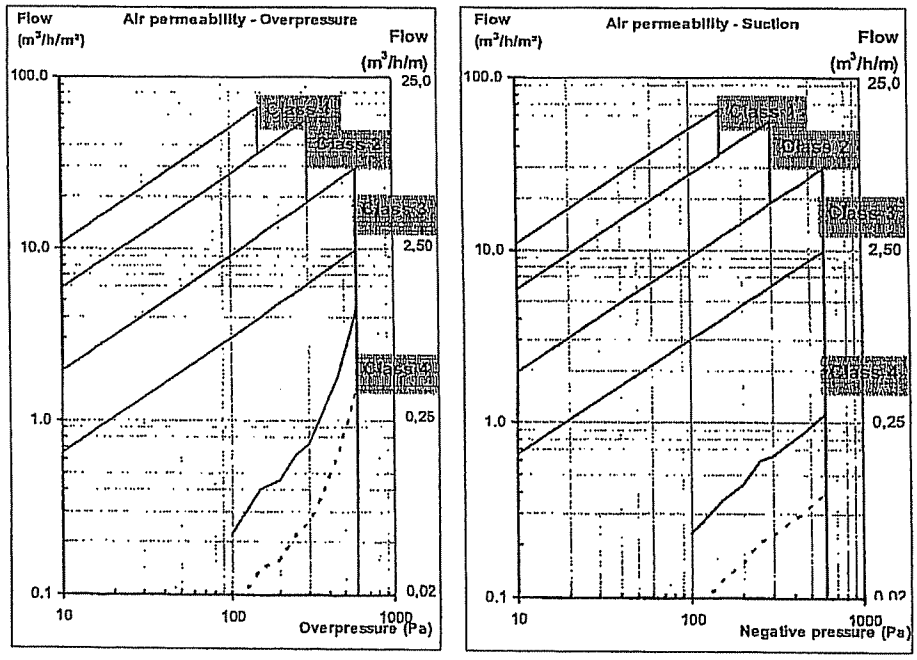
Temperatuur van de lucht in het laboratorium: 26°C
Atmosferische druk in het laboratorium: 1000.3 mb
Relatieve luchtvochtigheid: 61 %

4.1 Luchtdoorlatendheid

De gegevens van de luchtdoorlatendheidsproef worden gegeven in tabel 9 en geïllustreerd in de grafieken van afbeelding 8.

Tabel 10: Metingen van de luchtdoorlatendheid

Druk	Overdruk			Onderdruk		
(Pa)	Totaal Qt (m^3/h)	Q/m² Qts (m^3/hm^2)	Q/m Qtl (m^3/hm)	Totaal Qt (m^3/h)	Q/m² Qts (m^3/hm^2)	Q/m Qtl (m^3/hm)
50	0.00	0.00	0.00	0.00	0.00	0.00
100	0.41	0.22	0.08	0.43	0.23	0.08
150	0.73	0.40	0.14	0.65	0.36	0.12
200	0.82	0.45	0.16	0.81	0.45	0.16
250	1.16	0.64	0.22	1.09	0.60	0.21
300	1.33	0.73	0.26	1.17	0.64	0.23
450	3.23	1.78	0.62	1.60	0.88	0.31
600	8.18	4.49	1.57	2.01	1.11	0.39



Afbeelding 9 : Grafische voorstelling van de luchtdoorlatendheid

Tabel 8: Verschil van luchtdoorlatendheid voor en na de windweerstandsproeven

Druk (Pa)	Overdruk			Onderdruk		
	Totaal Qt (m^3/h)	Q/m^2 Qts (m^3/hm^2)	Q/m Qtl (m^3/hm)	Totaal Qt (m^3/h)	Q/m^2 Qts (m^3/hm^2)	Q/m Qtl (m^3/hm)
50						
100						
150						
200						
250						
300						
450						
600	6.97	3.83	1.34	1.97	1.08	0.38

Classificatie van de luchtdoorlatenheid:

- **Volgens NBN EN 12207: Klasse 4 (afb. 12).**

4.2 Weerstand tegen de wind

De metingen van de vervormingen in over- en in onderdruk worden respectievelijk gegeven in de tabellen 9 en 10.
L = afstand tussen K1 en K3 = geen structuurelement ⇨ niet uitgevoerd
F = K2 - (K1 + K3)/2

Tabel 9: Meting van de vervormingen in overdruk

Overdruk (Pa)	Vervormingen (mm)			Doorbuiging	
	K1	K2	K3	F (mm)	L/F
200					
400					
800					
1000					
1200					
1600					
2000					

Tabel 10: Meting van de vervormingen in onderdruk

Onderdruk (Pa)	Vervormingen (mm)			Doorbuiging	
	K1	K2	K3	F (mm)	L/F
200					
400					
800					
1000					
1200					
1600					
2000					

- **Opmerkingen gedurende de pulsaties (0 ⇒ -800 Pa ⇒ 0 ⇒ +800 Pa ⇒ 0)**
  - 50 pulsaties van 0 → 800 Pa in overdruk → 0 → -800 Pa in onderdruk : geen opmerkingen.
- **Veiligheidsproef:**
  - Een pulsatie tot 2400 Pa in overdruk: geen opmerkingen.
  - Een pulsatie tot 2400 Pa in onderdruk: geen opmerkingen.
- **Samengevat:**
  - Doorbuiging bij 1600 Pa : niet uitgevoerd
  - Geen opmerkingen tijdens de windpulsaties tot 800 Pa.
  - Behoud van de eigenschappen (Δ Q is kleiner dan 0,3 m³ / hm)
  - Veiligheidsproeven tot 2400 Pa.

Classificatie voor de windweerstand:

- **Volgens NBN EN 12210 : Klasse C 4**

4.3 Waterdichtheidsproef

De vaststellingen tijdens de waterdoorlatendheidsproef worden gegeven in tabel 11.

Tabel 11: Vaststellingen tijdens de waterdoorlatendheidsproef

Druk (Pa)	Duur minuten	NBN EN 12208	Infiltraties
0	15	1_A	geen infiltratie
50	5	2_A	geen infiltratie
100	5	3_A	geen infiltratie
150	5	4_A	geen infiltratie
200	5	5_A	geen infiltratie
250	5	6_A	geen infiltratie
300	5	7_A	geen infiltratie
450	5	8_A	geen infiltratie
600	5	9_A	geen infiltratie
750	5	E_{750}	geen infiltratie
900	5	E_{900}	water over de middendichtingsrubber onderaan het vast kader
1050	5	E_{1050}	niet uitgevoerd

Classificatie van de waterdichtheid:

- **Volgens NBN EN 12208: Klasse $E_{750\,A}$ (volgens methode A)**

Opmerkingen

- Toepassing van verbinding producten onder de glaslatten
- Toepassing van een continu doorlopende derde buitendichting

Bedieningskrachten

Tabel 12

Vleugel	*Meting 1 (N)*	*Meting 2 (N)*	*Meting 1 (N)*	*Gemiddelde (N)*
Opening van handgrepen	32	34	47	**38**
Opening van de vleugel	8	14	9	**10**
Sluiting van de vleugel	26	32	28	**29**
Sluiting van handgrepen	47	40	49	**45**
Sluiting na kipstand	90	91	88	**90**

Lengte van de handgreep: 105 mm

Classificatie voor bedieningskrachten: - **Volgens NBN EN 13115: Klasse 1**

4.5 Mechanische proeven op vleugel

Vleugel	Neusbelasting			Torsie		
Klasse	F	$a_1 - a_0$	$a_2 - a_0$	F	$a_1 - a_0$	$a_2 - a_0$
1	*200 N*			*200 N*		
2	*400 N*			*250 N*		
3	*600 N*			*300 N*		
4	*800 N*	*4.05 mm*	*0.16 mm*	*350 N*	*76 mm*	*<1 mm*

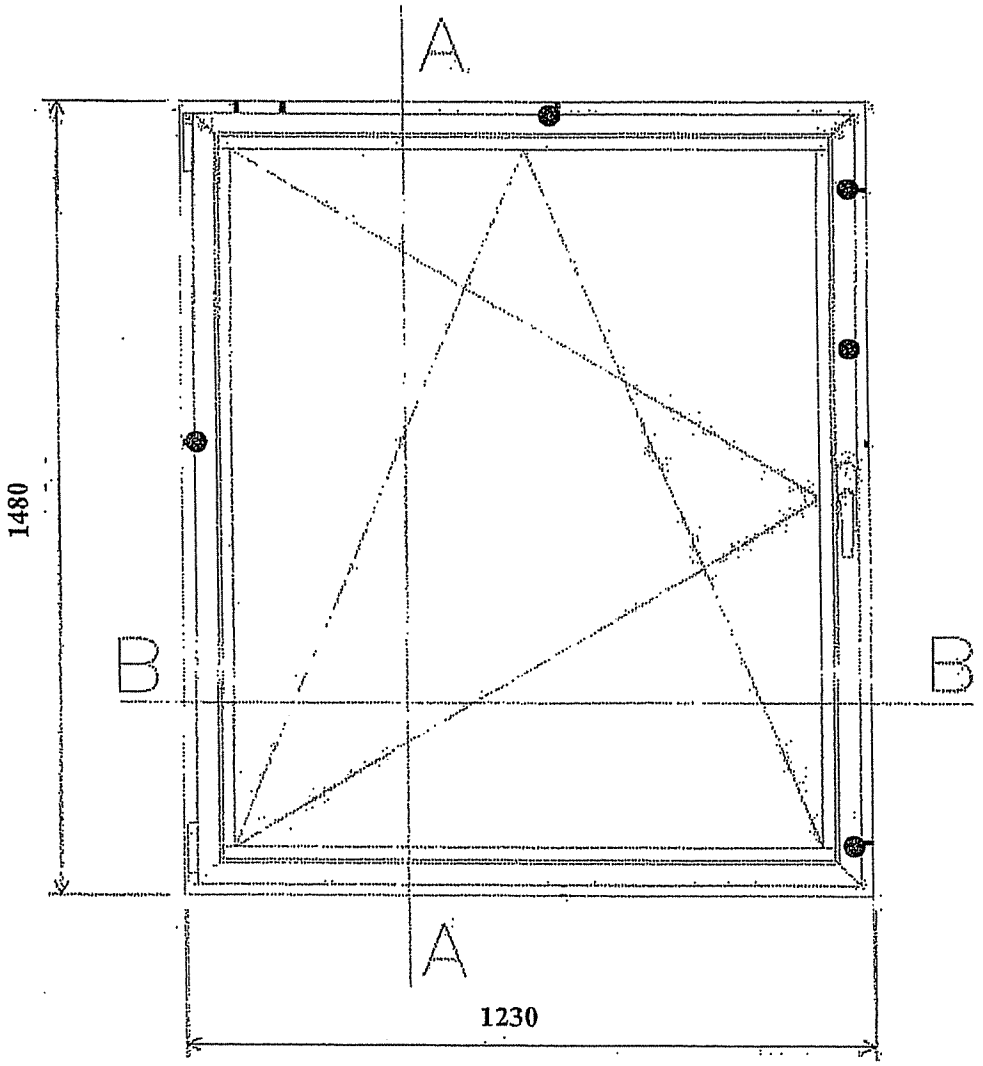
4.6 Samenvatting van de prestaties

De samenvatting van de door de proeven bepaalde prestaties wordt gegeven in tabel 13.

Tabel 13: Samenvatting van de prestaties

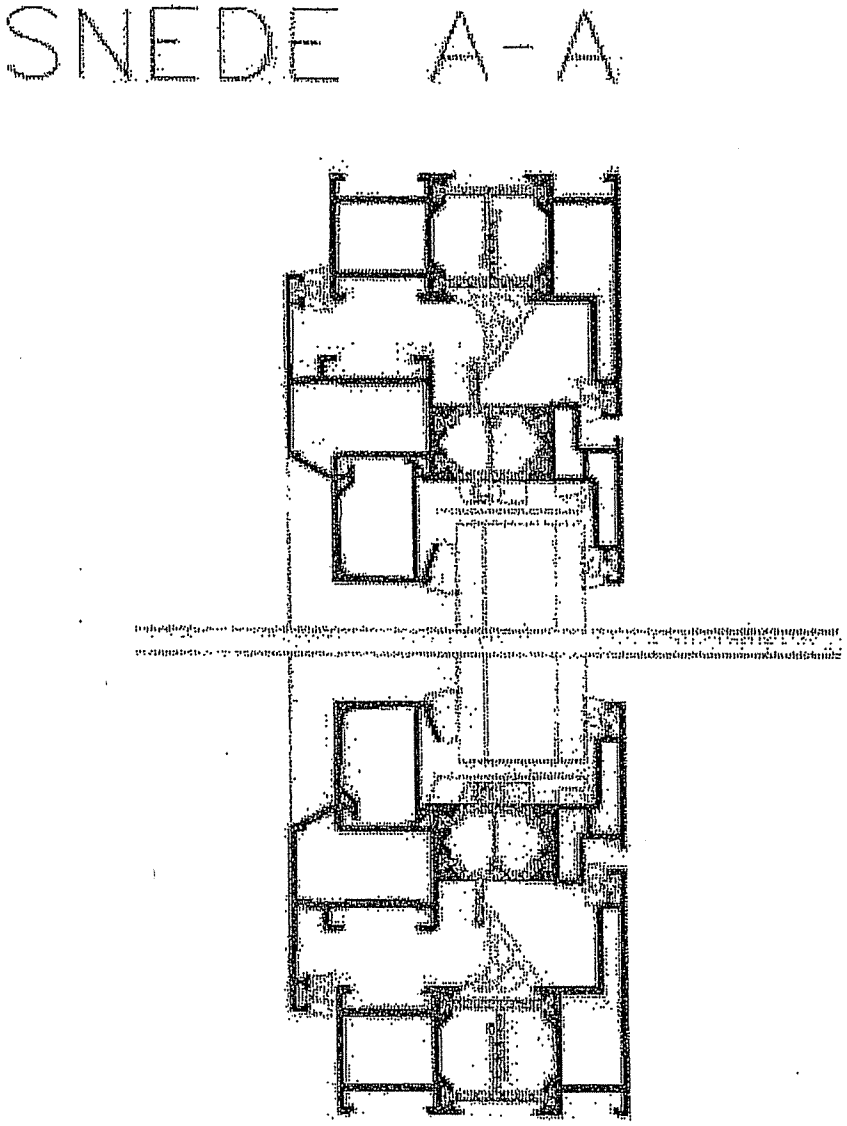
Proef	Europese normen
Luchtdoorlatendheid	4
Windweerstand	C4
Waterdichtheid	$E_{750\,A}$ (chrono-beslag)
Bedieningskrachten	Klasse 1
Mechanische proeven	Klasse 4
Schokproef met een groot, zacht lichaam	Niet uitgevoerd

Afbeelding 11: binnenzicht van het raam

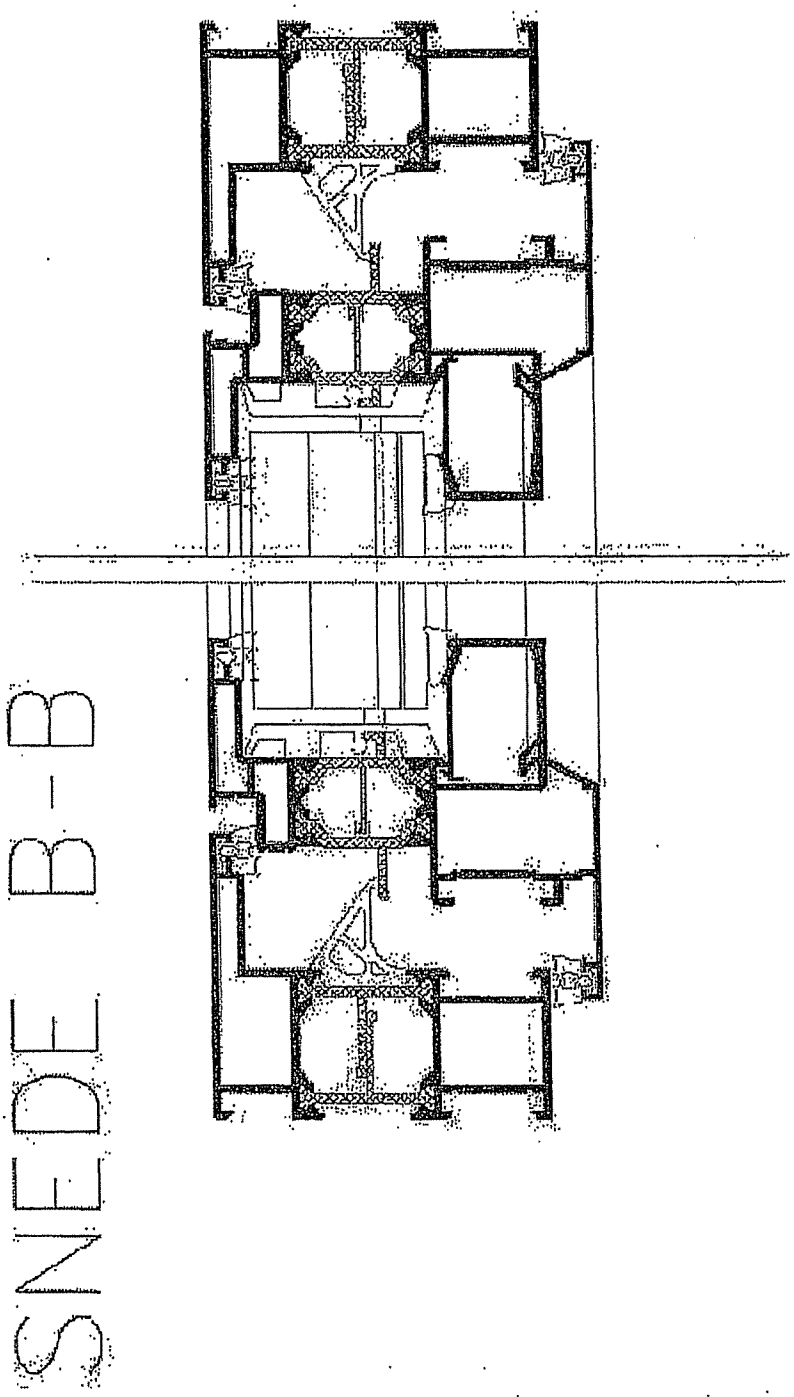


● sluitpunten

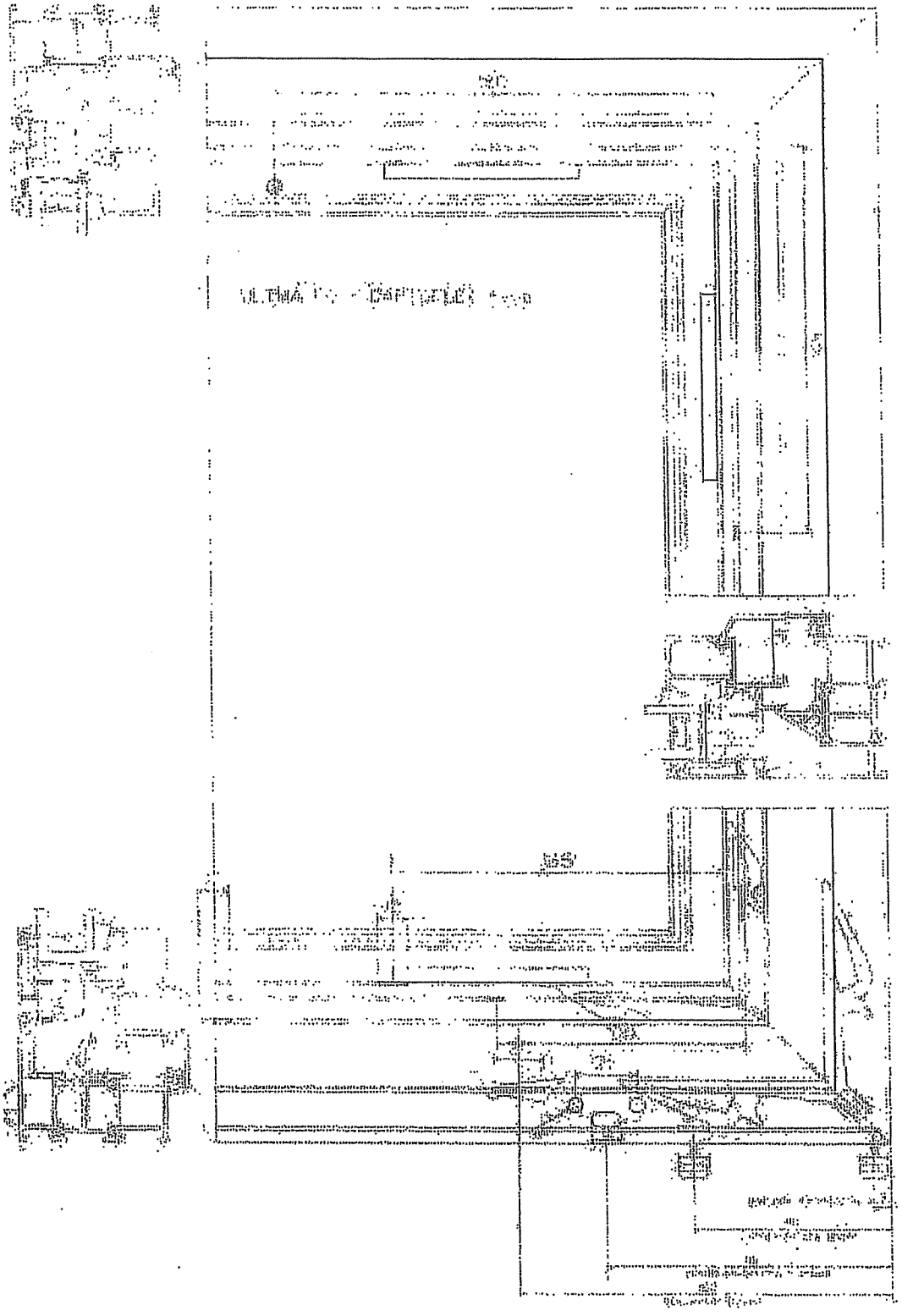
Afbeelding 12: Verticale snede van het raam

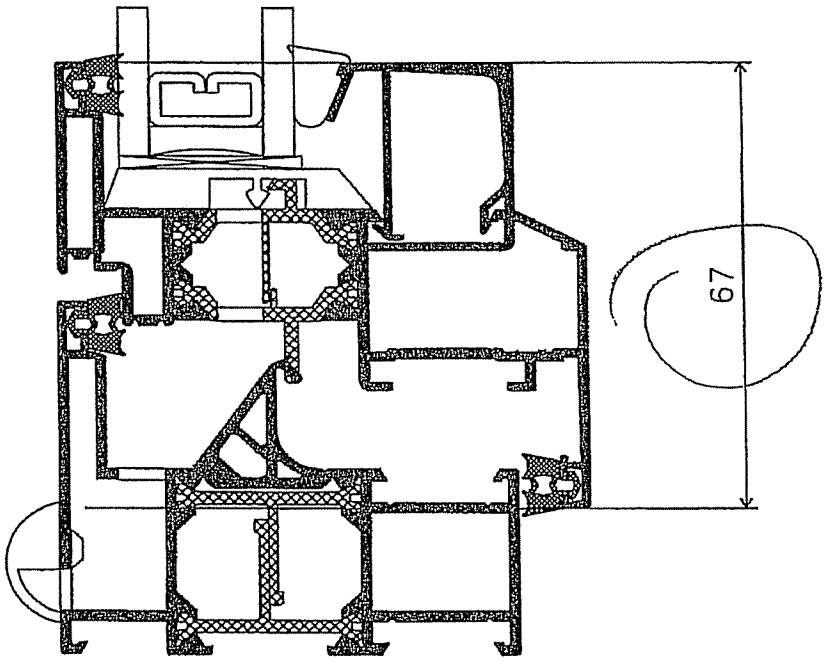


Afbeelding 13: Horizontale snede van het raam



Afbeelding 14: Verbindings methode van de kaders





A4 = SCALE 1:1